

Pharmacist Involvement in Optimizing Medication Use in Nursing Homes

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Abstract: Nursing home residents have many comorbidities, for which medication therapy is the treatment modality most utilized. The extensive use of medications among these residents is beneficial, but puts these individuals at high risk of experiencing adverse drug events. To optimize medication use in nursing home residents, we have witnessed an increased pharmacist involvement. This review presents how pharmacists can be involved in optimizing medication use among Norwegian nursing home residents. The review is based on a literature search (PubMed), knowledge of Norwegian nursing home studies involving pharmacists, and fifteen years of work experience. A conceptual framework guided the knowledge synthesis regarding the different work tasks identified at the individual, healthcare, and system level. Pharmacists contribute on different levels to ensure high-quality medication use in nursing homes, which means involvement in multidisciplinary teams to identify and solve medication-related problems. Collaboration with other healthcare professionals and teaching them about medication management are examples on the healthcare level. Involvement on the system level includes developing medication management procedures, providing medication statistics, investigating costs, and facilitating tender rounds. Studies investigating hard endpoints in nursing home residents were not identified. Although pharmacists as healthcare providers seem to be expanding their role, municipalities and the healthcare system seem to lack a strategy about how and where this resource can be used most effectively. Developing job descriptions for pharmacists, and preparing the healthcare setting and nursing homes for future challenges, should be prioritized.

Keywords: interventions, nursing homes, medications, pharmacists

Nursing homes provide 24-hour care to older adults with an increased need for medical attention, treatment, and care. In Norway, there exist 39,241 nursing home places, 9,090 short-term places and 39,241 long-term places (Statistics Norway (SSB), 2021). Persons in nursing homes are often referred to as residents, and the nursing home is usually their final place of residency before death. Reports state that the treatment of nursing home residents has become more advanced during the past two decades, and residents now have an even broader range of diseases and symptoms (Abelsen et al., 2014). For most of these illnesses, medicines are the most important treatment modality. Thus, extensive medication use in this population is frequent and expected (Thomson et al., 2009).

Since the mid 1990s the number of medicines that residents receive, on average, has increased from three to eight (Halvorsen et al., 2017). In 2010, 89% of nursing home residents used five or more medicines, while 46% used 10 or more, showing that polypharmacy is highly present (Soraas et al., 2014). The presence of polypharmacy is indeed beneficial for the residents, but could also lead to substantial risks resulting in deteriorating health and shorter life expectancy.

The nursing home staff are responsible for initiating and monitoring adequate medical treatment for their residents. For decades staff members have normally consisted of nurses, auxiliary nurses, and part-time physicians. While these healthcare team members have provided optimal treatment and end-of-life care, they have also faced rapid changes regarding new disease management, and more advanced use of medicines. In addition, other healthcare professionals, such as physiotherapists and pharmacists, have expanded their roles and become more active in nursing homes.

Provision of optimal treatment and care requires that team members receive adequate training, and update themselves on new treatment strategies and guidelines. Moreover, quality enhancement and continuous improvement require the primary care sector to establish quality management systems. There is considerable variation in how municipalities organize healthcare teams to manage medications within the nursing home sector. Studies support the need to bring pharmacists into multidisciplinary teams (Halvorsen et al., 2010). However, only a few municipalities in Norway have employed pharmacists, and the inclusion of

non-dispensing pharmacists in multidisciplinary nursing home teams is still anecdotal. In contrast, many hospitals have included (clinical) pharmacists as trusted multidisciplinary collaborators, as they possess profound knowledge about medicines.

Due to comorbidities and extensive medication use, nursing home residents can experience several medication-related problems that may potentially reduce medication treatment quality. A few pharmacist-led interventions have been tested to improve medication use among these residents. However, pharmacists also contribute to patient safety in other areas. A recent narrative review by Spinewine et al. concluded that pharmacist interventions in nursing homes effectively optimize medication use (Spinewine et al., 2021). However, the same review pointed out a limitation in the current literature to identify the most effective components, or specific disease and drug classes. Implementation of pharmacist services in nursing homes could represent an opportunity (Spinewine et al., 2021). However, ensuring high-quality medication for these residents requires a multifaceted approach, and interventions should target diverse levels.

This chapter presents and discusses pharmacists' interventions aiming to optimize the quality of medication therapy for residents, based on studies from the Norwegian nursing home setting.

Method

This literature review provided an examination of published articles on Norwegian nursing homes, and a selection of recently published international articles, identifying the nature and extent of pharmacists' involvement with nursing home patients. The literature review method is appropriate because it allows consolidation and summation, it finds omissions or gaps in the literature, and it builds knowledge from previous work (Grant & Booth, 2009). The review was based on a search in PubMed, using both medical subject headings (MESH) and free-text search. The two MESH terms "pharmacist" and "nursing home" combined retrieved 222 results. These 222 results were filtered using "article type review", resulting in 16 papers. From these 16

papers, it was decided to include two recently published papers (Lee et al., 2019; Spinewine et al., 2021), since they mirror how pharmacists work in Norway. Subsequently, the free-text search using the terms “pharmacist”, “nursing home” and “Norway” resulted in 17 studies. Of these 17 studies, 12 were included in the review, based on their relevance to the Norwegian setting and the author’s knowledge from working for more than fifteen years with medication therapy in older nursing home residents, either as an advisor or clinical pharmacist.

The knowledge synthesis, describing where pharmacists can play an active role to optimize medication use in nursing home residents, was conducted by applying a conceptual framework (Institute of Medicine, 2005) of four (three, see Figure 1) different levels: A) the resident (patient) level; B) the care team level; C) the system (nursing home) level; and D) the environment level. However, the fourth level (D) was considered to be beyond the scope of this study.

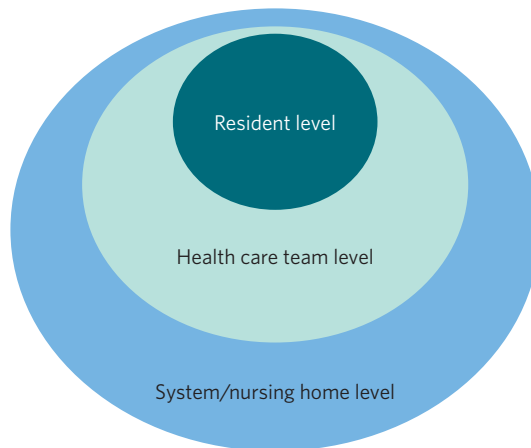


Figure 1. Framework Classifying Where the Pharmacist Could Play an Active Role to Ensure High-Quality Medication Use Among Nursing Home Residents

Results and Discussions

The results are based on 12 articles from the Norwegian nursing home setting, and two international articles mirroring how the author perceives how pharmacists work to improve the quality of medication

therapy in Norwegian nursing homes at the individual, healthcare and system level.

Individual Level

Pharmacist involvement in improving the quality of prescribing by performing medication reviews and assessing medication use among nursing home residents has been thoroughly studied. Since 2017, medication reviews on admission, and subsequently once yearly, have been required by law to achieve high-quality medication use among nursing home residents (Lovdata, 2021). However, a recent study concluded that only half of the residents received systematic medication reviews within the first month after admission, while 31% had not received this service within the first seven months (Hermann et al., 2021).

Medication reviews usually involve a four-step procedure including patient and medication history taking, systematic medication reviews, interdisciplinary case conference discussions, and pharmaceutical care planning (Halvorsen et al., 2019). While medication reviews result in a significant reduction in the number of medication-related problems, pooled estimates on hard endpoints, like falls, hospital admission and mortality, have been inconclusive, often explained by heterogeneity in studies. Nevertheless, physicians' acceptance rates of 70% regarding pharmacist recommendations show that pharmacists' medication reviews have a reasonable value in improving medication use among these residents.

Nursing home residents often have multiple chronic diseases and symptoms that fluctuate considerably. We have learned from medication review studies that overuse of inappropriate medication is prevalent among these residents. In addition, residents often receive too high doses, experience drug-drug interactions, and frequently use unnecessary medications. The unnecessary use of medications can be effectively reduced by deprescribing. Deprescribing constitutes safe reduction or removal of medications that are no longer indicated (Deprescribing.org, 2021). The concept of deprescribing has achieved growing interest, the goal of which is to reduce the medication burden or harm, and improve quality of life. Given the considerable number of unnecessary medications, making a

plan for deprescribing seems vital. Pharmacists often play an essential role in the process of identifying medications that could be deprescribed:

I now see [the] drugs patients received all year through, for example one patient who received a drug for allergy. So this year [after the pharmacist visit] was the first year it was discontinued. And when I checked the medical records, it had been given each day for several years. (nurse, nursing home) (Halvorsen et al., 2011)

Individuals who move into nursing homes are also moving to their second to last, and last phase in life, that is the end of life. Although there is considerable variance, Norwegian nursing home residents on average live no longer than 24 months (Helsedirektoratet, 2017). The residents' short life expectancy questions the importance of continuing prophylactic therapy (e.g., use of statins or bisphosphonates). Moreover, indications for treatment are often no longer valid. Both scenarios should potentially encourage deprescribing. However, nursing home physicians who initiate deprescribing often find that residents or their next of kin feel that the healthcare system has given up on them. Thus, they become more reluctant to discontinue treatment. The feeling of standing alone when it comes to these decisions is indeed difficult. Through their own experiences, pharmacists see their involvement as helping to make such decisions, which thus helps to reduce the uncertainty of whether to discontinue treatment or not.

Healthcare Level

Due to age-related physiological changes and altered pharmacokinetics and dynamics in older adults, several medications are considered inappropriate for older nursing home residents. Since pharmacists are trained to assess the impact of such changes, scrutinizing medication charts by using explicit medicinal criteria has become more common. Although the Beers criteria (American Geriatrics Society 2019 Updated AGS Beers Criteria® for Potentially Inappropriate Medication Use in Older Adults, 2019; Meld. St. 28) and the START and STOPP criteria (O'Mahony et al., 2015) have been given most attention, the NORGE-P-NH criteria

seem to be a more appropriate choice for Norwegian nursing home residents, especially as these validated criteria are based on nationally available medications (Nyborg et al., 2015). A few pharmacist-led studies have electronically identified the prevalence of inappropriate prescribing in nursing homes residents (Halvorsen et al., 2012) and older adults (Pagès et al., 2021). The findings of these studies are comparable to clinical studies, which also state that the use of inappropriate medications by these residents is highly prevalent. However, several of these studies have shortcomings, including lack of residents' clinical data and past medication history. Unfortunately, systematic use of these criteria in clinical practice is yet to come. Nevertheless, this method is regarded as beneficial in combination with medication reviews, since it systematically reminds pharmacists of medications representing potential risks for this population. Another possibility is that pharmacists use these screening tools to triage which residents should receive yearly medication reviews. In any case, identifying inappropriate prescribing is only a first step. The work of suggesting reasonable interventions that will ultimately result in improved quality of medication use remains to be done.

Performing explicit medication reviews and using information from criteria lists (i.e., medicines considered inappropriate for the elderly) have reduced inappropriate prescribing among these patients. Moreover, the drug-related problem framework established by the Pharmaceutical Care Network Europe has provided a rigorous structure to discuss suboptimal medication therapy (Pharmaceutical Care Network Europe (PCNE, 2021). The framework has been beneficial for many clinical pharmacists in promoting interdisciplinary collaboration with physicians and nurses, as it focuses on the residents' therapeutic problem instead of blaming the prescriber for misprescribing, or the nurses for mismanagement of medications.

The deliverance of high-quality medication services assumes that healthcare personnel have the right competence and training. The coordination reform of 2012 aims to encourage municipalities to take responsibility for their citizens, including nursing home residents. One of the objectives was to transfer tasks from hospitals to the primary care setting, such as home care services and nursing homes. In Norway, nursing

homes rely heavily on auxiliary nurses to care for their residents, but these healthcare professionals have minimum training in handling medication. Thus, to establish knowledge, skills and competence to administer medications to nursing home residents, they receive training from pharmacists. Staff education and supervision of students are essential aspects of pharmacists' contributions to ensure high-quality use of medicines (Lee et al., 2019). The result of this training is that auxiliary nurses can perform medication management and deliver medications to several thousand nursing home residents and receivers of homecare services daily.

System Level

Pharmacists must conduct clinical patient-centred work and gain experience to maintain patient safety for nursing homes residents. However, it is equally important to use this experience to develop high-quality medication management procedures. In nursing homes, pharmacists often develop and critically review medication management procedures. These procedures describe how medicines should be prescribed, dispensed, reviewed, and administered to residents. The importance of well-functioning procedures provides a safe working environment for healthcare workers, and preserves a positive experience for residents (Lee et al., 2019; Services & Conolly, 2016). Another essential task is to keep track of medication use both individually and overall. Pharmacists have a crucial role in monitoring overall medication use for these residents, delivering statistical analyses of differences in use and costs between nursing homes. Moreover, they should keep up with new treatment strategies and facilitate evidence-based practice by discussing new treatment alternatives within elderly care. This will ensure choosing the most appropriate medication therapy, providing the most value for money and minimising risk for residents.

At some nursing homes, nurses have the opportunity to administer medicines from a pre-approved medication list, so-called “as needed” medications. These medication lists include information about medications that nurses can administer to residents without first consulting

the physician, as a response to an acute change in diseases or symptoms. Pharmacists working at the municipality level, have closely collaborated with nursing home physicians and nurses to develop these lists, including medications for pain management, constipation and nausea. Although it is preferred to prescribe these medications to residents directly and keep use of such lists to a minimum, the situation with few doctors, especially in remote areas, could force municipalities to rethink how such lists could improve the quality of care for their residents.

Pharmacists' five years of university training provides them with profound knowledge on the use of medicines and especially drug-drug interactions. Pharmacists' involvement in developing databases that warn about dangerous medication combinations have minimized harmful drug-drug interactions. A study from 2010, using the Norwegian drug-drug interaction database, included 1,241 nursing home residents, and identified only 1.2% severe drug-drug interactions. At a glimpse, the identified prevalence seems relatively low, but medication combinations like these should be totally avoided, especially in frail old nursing home residents. Otherwise, the consequence could be fatal clinical outcomes.

Moreover, these databases rely on input from qualified personnel and seldom take into account pharmacodynamic interactions or changes in residents' pharmacokinetic parameters (absorption, first-pass metabolism, bioavailability, distribution, protein binding, renal and hepatic clearance). In addition, they fail to identify planned beneficial synergistic effects of known drug-drug interactions. However, timely conducted analyses of drug-drug interactions and screening for inappropriate medications, can improve the quality of medication use in these residents.

This chapter has so far described different pharmacists' interventions with the potential to optimize the quality of medication therapy for residents in nursing homes at the individual, healthcare, and system level. A systematic review and meta-analysis by Lee et al. summarize outcomes of pharmacist-led nursing home studies performed on different levels. Outcomes include: the number of fallers; fall rates; mortality; hospital use and admission; quality of medication prescribing in terms of medication appropriateness and total medication use by residents; cost analysis;

adverse events; physicians' acceptance rates of pharmacotherapy recommendations; and others (i.e., quality of life, activity of daily living, mental health and depression). The pooled analysis demonstrated that pharmacists' services improved fall rates, and found a trend towards reduced mortality rates, hospitalization and admission rates.

In contrast, few Norwegian nursing home studies have investigated similar outcomes, except for residents' total medication use (Fog et al., 2017) and physicians' acceptance rates (Halvorsen et al., 2010). Instead, the vast majority of studies involving pharmacists have focused on increasing the quality of prescribing by identifying medication-related problems on the individual level (Bakken et al., 2012; Davidsson et al., 2011; Devik et al., 2018; Fog et al., 2017). These studies combined reveal a considerable number of medication-related problems in this population. However, as none of these studies have investigated hard endpoints, like mortality, falls, or quality of life, allocating funds to employ clinical pharmacists in nursing homes has so far not been prioritized by the municipalities. Instead, municipalities have been increasingly interested in employing pharmacists on the system level. A report from 2019, based on interviews with pharmacists, states that the first pharmacist was employed on the municipality level in 2009 (Toverud & Håkonsen, 2019). Today, around ten highly-populated municipalities have employed pharmacists. The pharmacists perform quite diverse tasks within these municipalities, from patient-oriented tasks on the home service/nursing home level, to administrative tasks on the system level. The pharmacists who hold these positions consider themselves pharmaceutical advisors for the municipality, but they also emphasize the importance of their presence at larger nursing homes. Pharmacists reported collaborating on different levels, most extensively with nurses, followed by physicians. In contrast, collaboration with other pharmacists was almost non-existent (Toverud & Håkonsen, 2019).

This literature review has limitations, as only one bibliometric database was searched, and only one author reviewed the selection of articles. Furthermore, the known weaknesses of the applied method include the absence of intent to maximize the scope of the literature review, and the possibility of bias due to the selection process of articles with the potential

of omitting relevant literature (Grant & Booth, 2009). Another limitation is that the review did not use a formal quality assessment template. Knowledge of how pharmacists work with optimizing medication use in nursing home residents is seldom published in research papers or reports. Therefore, pharmacists might be doing work to optimize medication use in nursing home residents, which this review could have missed.

Conclusion

Pharmacists contribute on different levels to optimize medication use in nursing home residents. Although pharmacists, as healthcare providers, seem to be expanding their role, municipalities and the healthcare system seem to lack a strategy in terms of how this resource can be used most effectively. Developing job descriptions for pharmacists, which prepare the primary healthcare setting and nursing homes for future challenges should be prioritized.

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